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MICHAUD-Kinney Group LLP
306 INDUSTRIAL PARK ROAD
SUITE 206
MIDDLETOWN, CT 06457

EXAMINER	
BOYD, ERIN M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/586,032
Filing Date: July 13, 2006
Appellant(s): HELMERSSON ET AL.

Richard Michaud
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/2/2010 appealing from the Office action mailed 8/16/2010.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 28, 30, 31, 33, 34, 36-48, 50-52 and 54-57 currently stand rejected. Claims 1-27, 29, 32, 35, 49 and 53 are canceled.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5875223	Nylund	2-1999
5331679	Hirukawa	7-1994
6901128	Mori et al.	5-2005
5272741	Masuhara et al.	12-1993
4800061	Shallenberger et al.	1-1989
5778035	Nylund (2)	7-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 28-34, 36, 40-43, 47, 54, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,875,223 (herein after "Nylund") in view of U.S. Patent 5,331,679 (herein after "Hirukawa").**

3. Regarding Claim 28, Nylund teaches a spacer 7 for holding a number of elongated fuel rods 3 intended to be located in a nuclear plant (figure 2; column 2, lines 63-64), the spacer 7 enclosing a number of cells (space inside sleeve 9), each cell (spacing inside member 9) having a longitudinal axis and arranged to receive a fuel rod 3 in such a way that the fuel rod 3 extends substantially in parallel with the longitudinal axis (column 3, lines 11-12), each cell (space inside member 9) being formed by a sleeve 9, having an upper edge and a lower edge (figure 3; column 3, lines 10-11), the sleeve 9 including a number of abutment surfaces 10, which project inwardly towards

the longitudinal axis (column 3, lines 11-12) and extend substantially in parallel with the longitudinal axis for abutment 10 to the fuel rod 3 to be received in the cell (space inside member 9) (column 3, lines 20-21), and the lower edge, seen transversely to the longitudinal axis, having a wave with wave peaks 9b, which are aligned with a respective one of said abutment surfaces 10, and wave valleys 9a located between two adjacent ones of said abutment surfaces 10 (figure 5; column 3, lines 29-31); and the sleeves 9 abut each other in the spacer 7 along respective connection areas, each extending substantially parallel to the longitudinal axis between one of said wave valleys 9a of the lower edge and the flat upper edge (figures 3 and 4).

Nylund fails to teach that the upper edge, seen transversely to the longitudinal axis, has a wave with wave peaks, which are aligned with a respective one of said abutment surfaces, and with wave valleys located between two adjacent ones of said abutment surfaces, and that the connection areas extend substantially parallel to the longitudinal axis between one of the wave valleys lower edge and one of the wave valleys of the upper edge.

Hirukawa teaches a sleeve 12d wherein the upper edge, seen transversely to the longitudinal axis, has a wave with wave peaks 21b, which are aligned with a respective one of said abutment surfaces 13a, and with wave valleys 22 located between two adjacent ones of said abutment surfaces 13a (figure 13).

A motivation for constructing the sleeve to have a wave with wave peaks, which are aligned with a respective one of said abutment surfaces, and with wave valleys located between two adjacent ones of said abutment surfaces at the upper edge of said

sleeve is to provide a guide for the smooth insertion of the fuel rod into the fuel spacer (Hirukawa; column 9, lines 46-51). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have a wave with wave peaks, which are aligned with a respective one of said abutment surfaces, and with wave valleys located between two adjacent ones of said abutment surfaces at the upper edge of said sleeve.

Although Nylund and Hirukawa fail to independently teach an elongated abutment surface extending from one of said wave peaks of the upper edge to a respective one of said wave peaks of the lower edge and the connection area extending between the wave valley of the sleeve's upper edge, the combination of Nylund and Hirukawa suggests said limitation. Nylund teaches that the abutment surface 10 extends the whole length of the sleeve (column 3, lines 23-24), the connection areas extending substantially parallel to the wave valley of the lower edge to the upper edge of the sleeve (figures 3 and 4). As modified by the teaching of Hirukawa (i.e. modifying the sleeve of Nylund to included upper and lower wave peaks and valleys, as is taught in Hirukawa), the "whole length" would be from a wave peak of the upper edge to a respective wave peak of the lower edge and the connection areas would each extend from the wave valley of the lower edge to the wave valley of the upper edge.

4. Regarding Claim 30, Nylund teaches a spacer 7 wherein each sleeve 9 includes at least four of said abutment surfaces 10 (figure 3; column 3, lines 17-18).

5. Regarding Claim 31, Nylund teaches a spacer 7 wherein each of said abutment surfaces 10 is formed by a respective ridge projecting inwardly towards the longitudinal axis (figure 3; column 3, lines 18-19).

6. Regarding Claim 32, Nylund teaches a spacer 7 wherein the sleeves 9 abut each other in the spacer 7 along a connection area 9a extending in parallel to the longitudinal axis, but fails to teach that the connection area extends in parallel to the longitudinal axis between one of said wave valleys of the upper edge and one of said one of said wave valleys of the lower edge.

However, when the teaching of Nylund are combined with those of Hirukawa (i.e. constructing the sleeve with wave peaks and wave valleys on upper and lower edges), as described in the rejection of Claim 28 above, the connection area extends in parallel to the longitudinal axis between one of said wave valleys of the upper edge and one of said one of said wave valleys of the lower edge.

The motivation for constructing the sleeve with wave peaks and wave valleys on upper and lower edges is to provide a guide for the smooth insertion of the fuel rod into the fuel spacer (Hirukawa; column 9, lines 46-51). Thus, it would have been obvious to one of ordinary skill in the art to construct the sleeve with wave peaks and wave valleys on upper and lower edges.

7. Regarding Claim 33, Nylund teaches a spacer 7 with sleeves 9, but fails to teach that the sleeves are permanently connected to each other by means of weld joints.

Hirukawa teaches sleeves 12d that are permanently connected to each other by means of weld joints 23 (figure 13; column 1, lines 14-16).

A motivation for permanently connecting the sleeves with weld joints is to provide a simple, resilient, and inexpensive means for connecting the sleeves. Thus, it would have been obvious to one of ordinary skill at the time of the invention to permanently connect the sleeve with weld joints.

8. Regarding Claim 34, Nylund teaches a spacer 7 wherein said sleeves 9 are permanently connected to each other (figure 4, column 3, lines 33-37), but fails to teach that the sleeves are permanently connected to each other by means of weld joints and that said weld joint includes an edge weld at said connection area at at least one of the upper edge and the lower edge.

Hirukawa teaches sleeves 12d that are permanently connected to each other by means of weld joints 23 (figure 13; column 1, lines 14-16) and an edge weld at said connection area at at least one of the upper edge and the lower edge (figure 13; column 1, lines 14-16; *Examiner understands an edge weld to be a weld at an edge of a structure*).

A motivation for placing an edge weld at at least one of the upper edge and the lower edge is to provide the weld at the location points that are most susceptible to disconnection. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to place an edge weld at at least one of the upper edge and the lower edge of the sleeve.

9. Regarding Claim 36, Nylund teaches a spacer 7 wherein substantially each sleeve 9 is a sleeve-like shape (figure 3). The limitation “each sleeve” followed by a method step “manufactured of a sheet-shaped material that is bent to the sleeve-like shape”, is only of patentable weight in as much as the method step distinguish the final structure, and to the extent not impacting final structure are taken to be product-by-process limitations and non-limiting. A product by process claim is directed to the product per se, no matter how they are actually made. See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al, 218 USPQ 289, 292 (Fed. Cir. 1983), and In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make clear that it is the patentability of the final structure of the product “gleaned” from the process steps that must be determined in a “product-by-process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

10. Regarding Claim 40, Nylund teaches a spacer 7 wherein substantially each sleeve 9 has a wave shape of the lower edge.

Nylund fails to teach that the upper edge of the sleeve has a wave shape; however, when the teaching of Nylund are combined with those of Hirukawa (i.e. constructing the sleeve with wave peaks and wave valleys on upper and lower edges), as described in the rejection of Claim 28 above, the upper edge of said sleeve was a

wave shape.

A motivation for constructing the sleeve to have a wave shape at the upper edge is to provide a guide for the smooth insertion of the fuel rod into the fuel spacer (Hirukawa; column 9, lines 46-51). Thus, it would have been obvious to one of ordinary skill in the art to construct the sleeve with a wave shape at the upper edge. The limitation "each sleeve" followed by a method step "manufactured from a tubular material which is worked to the wave shape of the upper edge and the lower edge", is only of patentable weight in as much as the method step distinguish the final structure, and to the extent not impacting final structure are taken to be product-by-process limitations and non-limiting. A product by process claim is directed to the product per se, no matter how they are actually made. See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al, 218 USPQ 289, 292 (Fed. Cir. 1983), and In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make clear that it is the patentability of the final structure of the product "gleaned" from the process steps that must be determined in a "product-by-process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

11. Regarding Claim 41, Nylund teaches a spacer 7 wherein the sleeve 9 seen in the direction of the longitudinal axis has four substantially orthogonal long sides (see figure A below), wherein each long side includes one of said abutment surfaces 10 (figures 3

and 4).

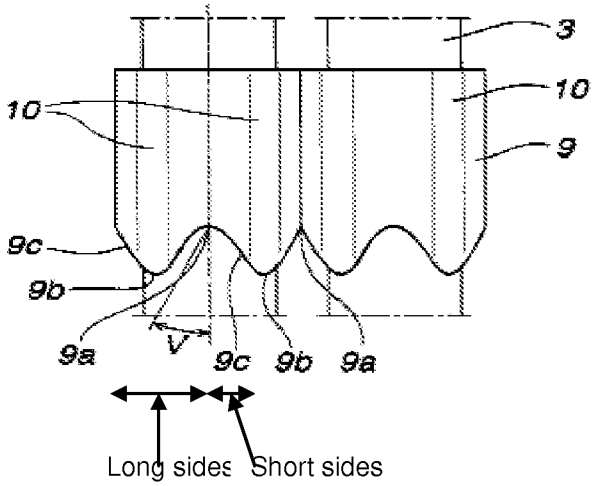


FIGURE A

12. Regarding Claim 42, Nylund teaches a spacer 7 wherein each long side (see figure A above) includes one of said wave peaks 9b of the lower edge, but fails to teach one of said wave peaks of the upper edge.

Hirukawa teaches a sleeve 12d with wave peaks 21b of the upper edge (figure 13).

A motivation for constructing the sleeve to have wave peaks of the upper edge is to provide a guide for the smooth insertion of the fuel rod into the fuel spacer (Hirukawa; column 9, lines 46-51). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have wave peaks at the upper edge.

13. Regarding Claim 43, Nylund teaches a spacer 7 wherein the sleeve 9, seen in the direction of the longitudinal axis, has four substantially orthogonal short sides (see

figure A above), wherein each short side connects two of said long sides (see figure A above) and includes with a portion of one of said wave valleys 9a of the lower edge, but fails to teach that said short sides include a portion of one said wave valleys of the upper edge.

Hirukawa teaches a sleeve 12d wherein short sides include with a portion of one of said wave valleys of the upper edge (figure 13).

A motivation for constructing the sleeve to have wave valleys of the upper edge is to provide a guide for the smooth insertion of the fuel rod into the fuel spacer (Hirukawa; column 9, lines 46-51). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have wave valleys at the upper edge.

14. Regarding Claim 47, Nylund teaches a spacer 7 wherein the nuclear plant is arranged to permit re-circulation of a coolant flow and wherein the spacer is arranged to be located in the coolant flow (column 3, lines 33-36), but fails to teach that the spacer includes at least one vane for influencing the coolant flow.

Hirukawa teaches a spacer 9b that includes at least one vane 32 for influencing the coolant flow (figure 3; column 5, lines 55-60.

A motivation for constructing the spacer to include at least one vane is to facilitate the recirculation of coolant within the reactor. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the spacer to include at least one vane.

15. Regarding Claim 54, Nylund teaches a spacer 7, but fails to teach that the spacer, seen in the direction of the longitudinal axis, has a substantially rectangular shape and includes at least two separate outer edge elements which extend along a respective side of the spacer.

Hirukawa teaches a spacer 9b wherein the spacer 9b, seen in the direction of the longitudinal axis, has a substantially rectangular shape and includes at least two separate outer edge elements 10, 11 which extend along a respective side of the spacer 9b (figure 2A; column 3, lines 55-58 and column 4, lines 6-8).

A motivation for constructing the spacer to have a substantially rectangular shape and at least two separate outer edge elements which extend along a respective side of the spacer is to provide outer support for a group of sleeves holding fuel rods that fits within the reactor channel. Said spacers facilitate reducing vibration effects on the sleeves, in turn, avoiding cracking and disconnection at weld location. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the spacer to have a substantially rectangular shape and at least two separate outer edge elements which extend along a respective side of the spacer.

16. Regarding Claim 57, Nylund teaches a fuel unit 1 for a nuclear plant including a number of elongated fuel rods 3 and a number of spacers 7 for holding the fuel rods 3 (figure 2; column 2, lines 63-64), wherein each of the spacers 7 enclose a number of cells (space inside sleeve 9), which each have a longitudinal axis and is arranged to

receive one of said fuel rods 3 in such a way that the fuel rod 3 extends in parallel to the longitudinal axis (column 3, lines 11-12), each cell (space inside member 9) is formed by a sleeve 9, which has an upper edge and a lower edge (figure 3; column 3, lines 10-11), the sleeve 9 includes a number of elongated abutment surfaces 10, which project inwardly towards the longitudinal axis (column 3, lines 18-19) and extend substantially in parallel with the longitudinal axis for abutment to the fuel rod 3 to be received in the cell (space inside member 9) (column 3, lines 20-21); the lower edge, seen transversely to the longitudinal axis, has a wave with wave peaks 9b, which are aligned with a respective one of said abutment surfaces 10, and wave valleys 9a located between two adjacent ones of said abutment surfaces 10 (figure 5; column 3, lines 19-31); the sleeves 9 abut each other in the spacer 7 along respective connection areas, each extending substantially parallel to the longitudinal axis between on of said wave valleys of the lower edge and the flat upper edge.

Nylund fails to teach that the upper edge, seen transversely to the longitudinal axis, has a wave with wave peaks, which are aligned with a respective one of said abutment surfaces, and with wave valleys located between two adjacent ones of said abutment surfaces, and that the connection areas extend substantially parallel to the longitudinal axis between one of the wave valleys lower edge and one of the wave valleys of the upper edge.

Hirukawa teaches a sleeve 12d wherein the upper edge, seen transversely to the longitudinal axis, has a wave with wave peaks 21b, which are aligned with a respective one of said abutment surfaces 13a, and with wave valleys 22 located between two

adjacent ones of said abutment surfaces 13a (figure 13).

A motivation for constructing the sleeve to have a wave with wave peaks, which are aligned with a respective one of said abutment surfaces, and with wave valleys located between two adjacent ones of said abutment surfaces at the upper edge of said sleeve is to provide a guide for the smooth insertion of the fuel rod into the fuel spacer (Hirukawa; column 9, lines 46-51). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have a wave with wave peaks, which are aligned with a respective one of said abutment surfaces, and with wave valleys located between two adjacent ones of said abutment surfaces at the upper edge of said sleeve.

Although Nylund and Hirukawa fail to independently teach an elongated abutment surface extending from one of said wave peaks of the upper edge to a respective one of said wave peaks of the lower edge, the combination of Nylund and Hirukawa suggests said limitation. Nylund teaches that the abutment surface 10 extends the whole length of the sleeve (column 3, lines 23-24), the connection areas extending substantially parallel to the wave valley of the lower edge to the upper edge of the sleeve (figures 3 and 4). As modified by the teaching of Hirukawa (i.e. modifying the sleeve of Nylund to included upper and lower wave peaks and valleys, as is taught in Hirukawa), the “whole length” would be from a wave peak of the upper edge to a respective wave peak of the lower edge and the connection areas would each extend from the wave valley of the lower edge to the wave valley of the upper edge.

17. **Claims 37, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,875,223 ("Nylund") and U.S. Patent 5,331,679 ("Hirukawa"), as applied to Claim 28, and further in view of U.S. Patent No. 6,901,128 (herein after "Mori et al.").**

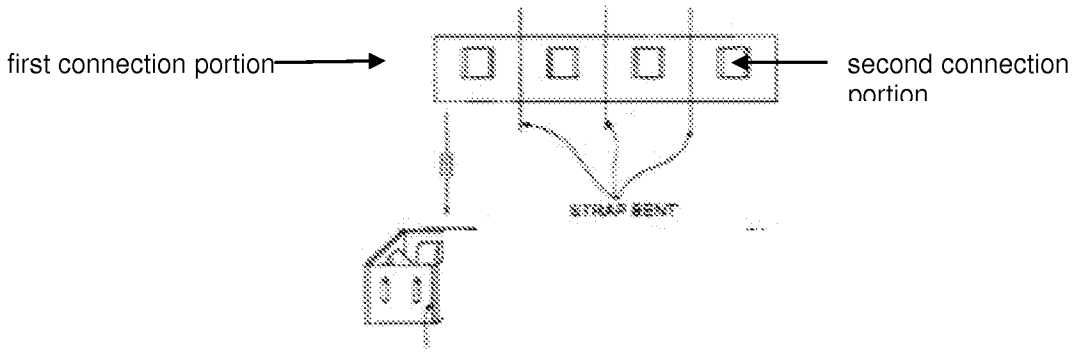
18. Regarding Claim 37, Nylund teaches a spacer 7, but fails to teach that the sheet-shaped material before said bending has a first connection portion in the proximity of the a first end of the sheet-shaped material and a second connection portion in the proximity of a second end of the sheet-shaped material, wherein the first end overlaps the second end of the sleeve after said bending.

Mori et al. teaches that a sheet-shaped material (figure 23) before said bending has a first connection portion (see figure B below) in the proximity of the a first end of the sheet-shaped material and a second connection portion (see figure B below) in the proximity of a second end of the sheet-shaped material, wherein the first end overlaps the second end of the sleeve after said bending.

A motivation for constructing the spacer such that the sheet-shaped material before said bending has a first connection portion in the proximity of the a first end of the sheet-shaped material and a second connection portion in the proximity of a second end of the sheet-shaped material, wherein the first end overlaps the second end of the sleeve after said bending is to facilitate constructing a sleeve from a single sheet of material with an interface at the ends of the single sheet of material where a connection means can be incorporated (e.g. a weld). Thus, it would have been obvious to one of

ordinary skill in the art at the time of the invention to construct the spacer such that the sheet-shaped material before said bending has a first connection portion in the proximity of the a first end of the sheet-shaped material and a second connection portion in the proximity of a second end of the sheet-shaped material, wherein the first end overlaps the second end of the sleeve after said bending.

19. FIGURE B



20. Regarding Claim 38, Nylund teaches a spacer 7, but fails to teach that the first connection portion and the second connection portion are permanently connected to each other by means of at least one weld joint.

Mori et al. teaches that that the first connection portion (see figure B above) and the second connection portion (see figure B above) are permanently connected to each other by means of at least one weld joint (laser weld) (figure 23; column 14, liens 42-44).

A motivation for welding the first connection portion to the second connection portion is to provide a simple, resilient, and inexpensive means for forming. Thus, it

would have been obvious to one of ordinary skill in the art at the time of the invention to weld the first connection portion to the second connection portion.

21. Regarding Claim 39, Nylund teaches a spacer 7, but fails to teach that said weld joint includes a spot weld. Mori et al. teaches a weld (figure 23; laser weld), but fails to teach that said weld is a spot weld; however, spot welding is an old and well known type of welding in the art as evidenced in Hirukawa (Abstract, lines 16-20).

The motivation for using a spot weld is to provide a resilient weld without excessive heating to the rest of the sheet due to the short amount of time necessary to accomplish a spot weld. Thus, it would have been obvious to one of ordinary skill in the art to connect the first connection portion and the second connection portion employing a spot weld.

22. **Claims 48 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,875,223 ("Nylund"), U.S. Patent 5,331,679 ("Hirukawa"), and U.S. Patent No. 6,901,128 ("Mori et al."), as applied to Claim 37, and further in view of U.S. Patent No. 5,272,741 (herein after "Masuhara et al").**

23. Regarding Claim 48, Nylund teaches a spacer 7 wherein the nuclear plant is arranged to permit re-circulation of coolant flow, wherein the spacer is arranged to be located in the coolant flow, but fails to teach that that spacer includes at least on vane for influencing coolant flow, said vane being formed by a portion of the material, which

extends from the first connection portion.

Mori et al. teaches a first connection portion (see figure B above), but fails to teach that a vane is formed extending from said portion.

Masuhara et al. teaches that a vane 8 for influencing coolant flow formed by a portion of the material. *Examiner notes that if the sleeve of Masuhara et al. 7 is constructed by a folding sheet, like that taught in Mori et al., then the vane would extend from the first connection portion since the sleeve is constructed of a single sheet.*

A motivation for constructing the sleeve with a vane extending from the first connection portion is to facilitate coolant circulation without having to weld/attach vanes onto the sleeve. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve with a vane extending from the first connection portion.

24. Regarding Claim 51, Nylund teaches a spacer 7, but fails to teach that a vane is inclined in relation to the longitudinal axis.

Masuhara et al. teaches a vane 8 that is inclined in relation to the longitudinal axis (figure 2 and 3).

A motivation for constructing the vane to incline in relation to the longitudinal axis is to facilitate the circulation of coolant by providing structures (vanes) that extend into the coolant path. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the vane to incline in relation to the longitudinal axis.

25. **Claims 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,875,223 ("Nylund") and U.S. Patent 5,331,679 ("Hirukawa"), as applied to Claim 28, and further in view of U.S. Patent No. 4,800,061 (herein after "Shallenberger et al.").**

26. Regarding Claim 44, Nylund teaches a spacer 7 and a sleeve 9, but fails to teach that the sleeve has a thickness of the material, which is less than 0.24 mm.

Shallenberger et al. teaches a sleeve 70 that has a thickness of the material, which is less than 0.24 mm (figures 7 and 8; column 8, lines 23-29, 46-51).

A motivation for constructing the sleeve to have a thickness which is less than 0.24 mm is to minimize the pressure drop in the coolant flow. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have a thickness which is less than 0.24 mm.

27. Regarding Claim 45, Nylund teaches a spacer 7 and a sleeve 9, but fails to teach that the sleeve has a thickness of the material, which is less than 0.20 mm.

Shallenberger et al. teaches a sleeve 70 that has a thickness of the material, which is less than 0.20 mm (figures 7 and 8; column 8, lines 23-29, 46-51).

A motivation for constructing the sleeve to have a thickness which is less than 0.20 mm is to minimize the pressure drop in the coolant flow. Thus, it would have been

obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have a thickness which is less than 0.20 mm.

28. Regarding Claim 46, Nylund teaches a spacer 7 and a sleeve 9, but fails to teach that the sleeve has a thickness of the material, which is less than 0.18 mm.

Shallenberger et al. teaches a sleeve 70 that has a thickness of the material, which is less than 0.18 mm (figures 7 and 8; column 8, lines 23-29, 46-51).

A motivation for constructing the sleeve to have a thickness which is less than 0.18 mm is to minimize the pressure drop in the coolant flow. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to have a thickness which is less than 0.18 mm.

29. **Claims 50 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,875,223 ("Nylund") and U.S. Patent 5,331,679 ("Hirukawa"), as applied to Claim 28, and further in view of U.S. Patent No. 5,272,741 (herein after "Masuhara et al.").**

30. Regarding Claim 50, Nylund teaches a spacer 7, but fails to teach that the sleeve includes a slit, which extends from at least one of the upper edge and lower edge and which permits outward bending of a part of the sleeve for forming said vane.

Masuhara et al. teaches a spacer 6 wherein the sleeve 7 includes a slit (figure 2), which extends from at least one of the upper edge and lower edge and which permits

outward bending of a part of the sleeve 7 for forming said vane 8 (figure 2).

A motivation for constructing the sleeve to include a slit which extends from at least one of the upper edge and lower edge and which permits outward bending of a part of the sleeve for forming said vane is to facilitate coolant circulation without having to weld/attach vanes onto the sleeve. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the sleeve to include a slit which extends from at least one of the upper edge and lower edge and which permits outward bending of a part of the sleeve for forming said vane.

31. Regarding Claim 52, Nylund teaches a spacer 7 wherein the sleeve 9 seen in the direction of the longitudinal axis has four substantially orthogonal long sides (figure 4), but fails to teach that a vane extends outwardly from one of said long sides (see figure A above).

Masuhara et al. teaches a vane 8 that extends outwardly from one of side of the sleeve 7. If the teachings of Masuhara are combined with the teachings of Nylund (i.e. the vanes, taught in Masuhara, constructed on the sleeve, taught in Nylund), the vane would necessarily extend outwardly from one of said long sides of the sleeve (Nylund) since the sleeve is a single piece.

A motivation for constructing the sleeve with a vane that extends outwardly from one of said long sides is to impart a swirling motion to the coolant which increases the thickness of the liquid film whereby heat transfer from the fuel rod to the coolant is promoted (Masuhara et al.; column 4, lines 49-61). Thus, it would have been obvious to

one of ordinary skill in the art to construct the sleeve with a vane that extends outwardly from one of the long sides.

32. **Claims 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,875,223 ("Nylund") and U.S. Patent 5,331,679 ("Hirukawa"), as applied to Claim 28, and further in view of U.S. Patent No. 5,778,035 (herein after "Nylund (2)").**

33. Regarding Claim 55, Nylund teaches the spacer 7, but fails to teach that one of the four corners of the rectangular shape is reduced through the lack of outer sleeve, and that the spacer includes a separate inner edge element, which extends along two of said sides and along said reduced corner.

Nylund (2) teaches a spacer 11 wherein one of the four corners of the rectangular shape is reduced through the lack of outer sleeve 7f, and that the spacer 11 includes a separate inner edge element a, b which extends along two of said sides and along said reduced corner (figure 6; column 6, lines 45-67).

A motivation for constructing the spacer wherein one of the four corners of the rectangular shape is reduced through the lack of outer sleeve is to reduce turbulence in the coolant flow by eliminating obstructions (spacer structure that is not filled by sleeves) and the motivation for constructing the spacer to include a separate inner edge element, which extends along two of said sides and along said reduced corner to provide addition lateral support for the fuel rods extending through the sleeves. Thus, it

would have been obvious to one of ordinary skill in the art at the time of the invention to construct the spacer wherein one of the four corners of the rectangular shape is reduced through the lack of outer sleeve, and that the spacer includes a separate inner edge element, which extends along two of said sides and along said reduced corner.

34. Regarding Claim 56, Nylund teaches a spacer 7, but fails to teach that the inner edge element includes a vane, which is located at said reduced corner and which is inclined upwardly and inwardly towards a centre of the spacer.

Masuhara et al. teaches a spacer 11, wherein the inner edge element a,b includes a vane 12, which is located at said reduced corner and which is inclined upwardly and inwardly towards a centre of the spacer 11 (figure 6; column 6, lines 57-61).

A motivation for constructing the spacer such that the inner edge element includes a vane, which is located at said reduced corner and which is inclined upwardly and inwardly towards a centre of the spacer is to facilitate mixing of the coolant flow and temperature equalization thereof within the mixing cross section (Nylund (2); column 6, lines 57-61 and column 5, lines 60-65). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to construct the spacer such that the inner edge element includes a vane, which is located at said reduced corner and which is inclined upwardly and inwardly towards a centre of the spacer.

(10) Response to Argument

Appellant's invention is, in short, a spacer sleeve with upper and lower edges having a wave configuration. The only difference between Appellant's invention and the spacer sleeve disclosed in Nylund is the that Appellant's spacer has a wave configuration on the upper, as well as the lower, edge of the spacer sleeve while Nylund has a wave configuration only on the lower edge of the spacer sleeve. Hirukawa teaches the concept of a spacer sleeve having a wave configuration on both the upper and lower edges. The combination of Nylund and Hirukawa suggests modifying Nylund to include a wave configuration on its upper edge in addition to its lower edge, as taught in Hirukawa. Hirukawa teaches that having projections on the upper edge (downstream side) of the spacer sleeve facilitates the smooth insertion of the fuel rod into the spacer sleeve (Hirukawa; column 9, lines 46-51). Furthermore, a wave configuration on the upper edge of the spacer sleeve will also facilitate the capture of foreign matter on the downstream edge to keep said matter from contacting the fuel rod from the downsteam direction. Nylund teaches that a spacer with a wavy configuration on its lower edge prevents foreign matter from contacting the fuel rod from the upsteam direction (column 2, lines 21-26).

Appellant argues on page 14, paragraph 1 of the appeal brief that there is no motivation to combine Nylund and Hirukawa because they disclose different intended uses.

The examiner disagrees. It has been held that a prior art reference must either be in the field of appellant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the appellant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, both Nylund and Hirukawa are in the field of Appellant's endeavor and reasonably pertinent to the particular problem with which the appellant was concerned.

The examiner also recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, a motivation to combine the references is found in the references and in the knowledge generally available to one of ordinary skill in the art. Two such motivations are provided above and in the final office action.

The appellant argues on page 16, paragraph 3 that Nylund fails to disclose or suggest that the connection areas extend between one of the wave valleys of the upper edge and one of the wave valleys of the lower edge, as recited in the instant claims.

In response the examiner notes that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Nylund alone does not teach the disputed limitation because Nylund does not teach a wave valley on the upper edge; however, Hirukawa is applied to address the deficiency of Nylund.

Appellant argues on page 17, paragraphs 3 and 4 that the "petal portions" of Hirukawa are not wave peaks and wave valleys at all, but are different and irregular geometric designs. However, Appellant contradicts himself. The specification clearly discloses that the upper and lower edges of the spacer sleeve of Hirukawa (US-5,331,679) have wave peaks and wave valleys (specification; page 4, paragraph 0012, lines 5-8). Furthermore, Hirukawa discloses that the waves may take the same or different shapes (Hirukawa; column 2, lines 26-28) and that the waves need not be "irregularly" shaped (Hirukawa; column 2, lines 23-25).

Appellant notes on page 18, paragraph 2 that Hirukawa shows only two peaks, but does not show any [upper] peaks on the rear side of the sleeve.

While it is irrelevant to the appeal whether or not there are upper peaks in addition to the two illustrated in figure 13, the examiner notes that figure 13 may be a partial illustration and should not be interpreted as only having two upper peaks, especially since figures 4 and 10 show four upper peaks.

Appellant argues on page 18, paragraph 3 that Hirukawa fails to teach peaks at the upper edge of the sleeve aligned with the peaks at the lower edge of the sleeve.

As a point of clarification, the claims do not recite that the peaks at the upper edge are aligned with the peaks at the lower edge. The claims actually recite that the peaks at the upper and lower edges are aligned with an abutment surface. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Hirukawa teaches peaks 21b at the upper edge of the spacer sleeve aligned with an abutment surface 13a (where there are four peaks at the upper surface; figures 13 and 4). Nylund teaches peaks 9b on the lower edge of the spacer sleeve aligned with an abutment surface 10.

The modification of Nylund to include peaks at the upper edge of the spacer sleeve, as taught in Hirukawa, would require each abutment surface to extend between the corresponding peaks at the upper and lower edges because Nylund discloses that the abutment surfaces 10 extend along the whole length of the sleeve (column 3, lines 23-24) and they are arranged to facilitate contact between the wave peak and the fuel rod 3 (column 3, lines 49-53).

Appellant states again on page 18; paragraph 6, lines 4-5 that neither Nylund nor Hirukawa discloses or suggests wave shapes on both the upper and lower edges of a

sleeve. The Examiner again notes the direct contradiction of this statement with the disclosure of the specification which states that Hirukawa teaches "both the lower edge and the upper edge may according to one embodiment have a wave-like shape with wave peaks and wave valleys" (specification; paragraph 0012, lines 5-7).

Appellant argues, beginning on page 19, that a multi-step process is required to modify the prior art. The examiner disagrees.

The first step (i.e., modifying the sleeves to include wave shapes on both edges) is not a step at all because Hirukawa specifically teaches a sleeve including wave shapes on both edges. As stated above, the specification supports this assertion.

The second step (i.e., modifying the sleeve such that the wave shape of the upper edge is aligned with the wave shape on the lower edge) is not considered a necessary step because this feature is not expressly recited in the claims.

Furthermore, Nylund discloses that the abutment surfaces 10 extend along the whole length of the sleeve (column 3, lines 23-24) and they are arranged to facilitate contact between the wave peak and the fuel rod 3 (column 3, lines 49-53). Thus, the modification of Nylund to include a wave peaks at the upper edge requires the wave peaks at the upper and lower edges to be aligned with each other.

The third step (i.e., determining if the abutment surface should be like that of Nylund or that of Hirukawa) should not be considered a separate step because Nylund is the primary reference and all that is suggested from the combination of Nylund and Hirukawa is the addition of wave peaks at the upper edge of the spacer sleeve of

Nylund. The combination does not suggest replacing the abutment surfaces of Nylund with those of Hirukawa.

Furthermore, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Appellant argues on page 19, paragraph 3 that Nylund and Hirukawa teach away from each other. The prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed. See *In re Fulton,* 391 F.3d 1195,1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004). MPEP §2141.02. A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments. See *Merck & Co. v. Biocraft Laboratories,* 874 F.2s 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied,* 493 USPQ 975 (1989). MPEP §2123.

Thus, the fact that Nylund and Hirukawa merely teach different alternatives for spacer sleeve design, they do not teach away from each other as argued by Appellant.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/E. M. L./

Examiner, Art Unit 3663

/JACK KEITH/

Supervisory Patent Examiner, Art Unit 3663

Conferees:

/J. K./

Jack Keith, Supervisory Patent Examiner, Art Unit 3663

Heather Shackelford /hcs/

Conferee